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2017 Annual Foray of the North American Mycological Association

Primer Part III. Time to pack those bags!

By Britt A. Bunyard

Title: The 2017 NAMA Northwoods Foray
When: 7-10 September 2017
Where: Lakewoods Resort, Lake NAMAkagon, Wisconsin
Coordinators: Britt A. Bunyard; Emily Stone, Naturalist/Education Director, Cable Natural History Museum, Cable, Wisconsin; Patrick Leacock, Field Museum of Natural History, Chicago

Make plans now to be in northwestern Wisconsin next September. Specifically, Bayfield County. This is my absolute favorite place in Wisconsin for both natural beauty and mushrooms, and I know you will feel the same way after this year's NAMA Foray. In the two previous editions of *The Mycophile* I gave you a sneak peek of what to expect, including costs, accommodations, and excellent dining at the Lakewoods Resort (part I), as well as how to get there and other great things to do in the area (part II). In this edition, I'll give you a sneak peek at our lineup of presenters and expert mycologists from the Midwest who will be on hand, along with what to pack. **Registration is set to open in two weeks. Be sure to check the NAMA website and next issue of this newsletter for details.**

A whole lot of brainpower…
If you're like half of the attendees coming to this year's NAMA foray in Wisconsin, you'll be unfamiliar with the mushrooms (and plants) of our area. Not to worry! We have an incredible lineup of presenters, instructors, foray leaders, and experts who will be on hand to educate and help us to figure out what's what. Our Chief Mycologist is Dr. Patrick Leacock, a long-time NAMA member and scientist at the Field Museum in Chicago. I am thrilled to announce our Keynote addresses will be given by Dr. Robert Blanchette (U of MN), Dr. Nicholas Money (U of Miami, Ohio), Dr. Michael Beug (Emeritus, Evergreen State U), and Dr. Greg Mueller (Chicago Botanic Garden). Additional presentations will be given by Dr. Lisa Grubisha (UW-Green Bay), Dr. Greg Thorn (U of Western Ontario), Dr. Heather Hallen-Adams (U of Nebraska), Dr. Daniel Lindner (Forest Products Lab at UW), Dr. Peter Kennedy (U of MN), Dr. Andy Miller (U of Illinois), Dr. Jonathan Walton (Michigan State U), Gary Lincoff (NY Botanical Garden), Dr. Tom Volk (UW-LaCrosse), and others. We have several hands-on (and taste buds-on) workshops planned to educate beginners in the ways of cultivation, photography, and "fermentology." And oh yes there will be, not one, but two mycophagy events.

I'm ready! What should I pack?
I'm glad you asked. Early September in northern Wisconsin is usually a very pleasant place to be outdoors. In the several years we have held a foray at this site, the forest conditions have always been nicely moist but not usually muddy as the heavy rains typically come in August. Temperatures have ranged from warm t-shirt days (last year) to more typically cooler jacket weather. You would be wise to check weather in the days before heading to Bayfield Co. Cooler weather has the advantage of bringing on the early fall colors and keeping away any signs of

(Continued on p. 3)

UPCOMING FORAYS & OTHER EVENTS

The events page of *The Mycophile* publicizes forays and events of NAMA affiliated clubs which may be of interest to our members. If you would like to list your club's next big event, contact Dianna Smith, Editor: mycophile@namyco.org.
Include date, location, brief description, link for information, and host organization name.
To post your event on the NAMA website, contact the webmaster: webmaster@namyco.org.

JULY 21-22: West Virginia Mycological Club (WVMC) Shelly Conrad Memorial Foray, Dry Fork, West Virginia with Gary Lincoff, Walt Sturgeon, Tom Volk and other mycologists. Registration will be available soon at https://www.wvmushroomclub.net.

JULY 27-30: Annual NEMF Sam Ristich Foray, Stratton Mountain, Stratton, Vermont. Gary Lincoff is Chief Mycologist. See www.nemf.org for information and to register.

AUGUST 10-13: NAMA's Regional Pinetop Arizona Foray in the White Mountain conifer forests with Dr. Scott Bates. See https://www.arizonamushroomsociety.org/event-2469863 for updated information.

SEPTEMBER 1-4: COMA's Clark Rogerson Foray will be returning to the completely refurbished Camp Hemlocks in Hebron CT. Registration opens in June. See www.comafungi.org.

SEPTEMBER 7-10: NAMA Northwoods Annual Foray at Lakewoods Resort, Lake Namakagon, Wisconsin. Registration opens in mid-March!. Consult www.namyco.org for updates.

SEPTEMBER 28-OCTOBER 1: Wildacres 2017 Foray with mycologist Brandon Matheny of the University of Tennessee and others. For more information about the retreat center see http://www.wildacres.org./. The registration form ican be downloaded at http://www.namyco.org/events.php.

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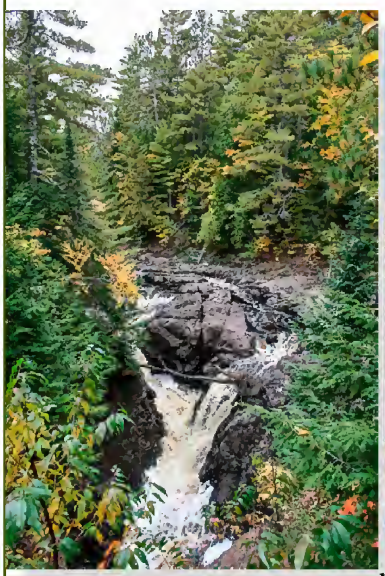
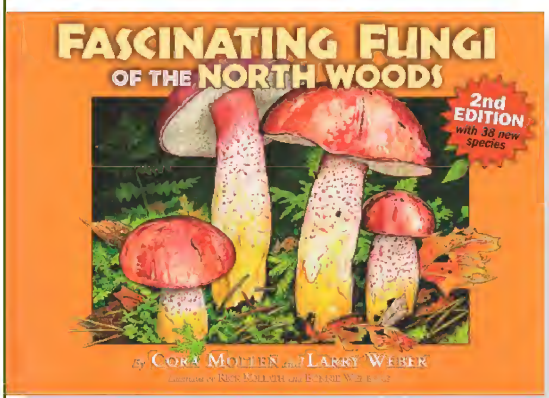
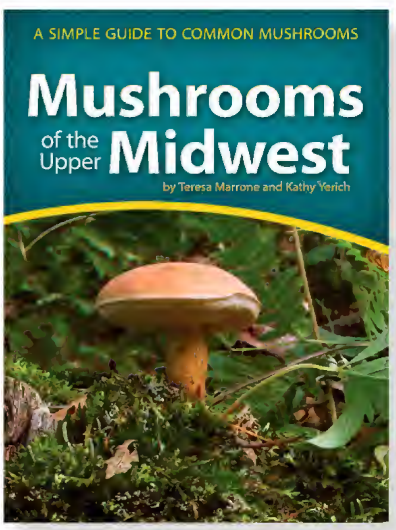


mosquitos. There are usually no other pesky insects. There is no poison oak. There are no snakes nor scorpions, nor really any other nasty creatures to watch for. Hiking is in general pretty flat with only the slightest of inclines—this is the Midwest. In fact, even persons with disabilities will be able to enjoy this year's NAMA Foray. The Lakewoods Resort where we are staying is fully handicap-accessible and has handicap facilitated rooms; our most scenic foray site is also fully wheelchair accessible. (It really is scenic and it really does have the mushrooms every year!)

We do have some forays planned to boggy sites but regular hiking boots should suffice. We have a very exciting all-day foray to the Apostle Islands planned. If that sounds like your ticket and you need Dramamine, pack that. I can recommend some great guide books that you may want to pick up to prepare and acquaint yourself with our Northwoods mushrooms. The first is *Fascinating Fungi of the North Woods* by Cora Mollen and Larry Weber (Kollath & Stensaas Publishing). I love this book (and all the titles by this company)! It features watercolors of the mushrooms and great little stories, plus it's not expensive. Next is *Mushrooms of the Midwest* by Teresa Marrone and Kathy Yerich (Adventure Publications, Inc.). I love this book too! It's compact but crammed full of mushrooms, great descriptions and really nice photos; also very affordable. Co-author Kathy Yerich (of the MN club) will be at this year's NAMA foray! And finally I cannot leave out *Mushrooms and Macrofungi of Ohio and the Midwestern States* from The Ohio State University Press. (Of course I'm a bit biased.) Two of the authors will be on hand at the foray—Walt Sturgeon and me!

And finally, bring anything (and anyone) else along that you may need in order to have a good time. And that includes food and beverages—this is not a "dry" foray site. See you soon!





BULLETIN 642
Mushrooms and Macrofungi of Ohio and the Midwestern States:
A Resource Handbook
Landon H. Rhodes
Britt A. Bunyard
Walter E. Sturgeon
Sarah D. Ellis Williams
Introduction by C. Wayne Ellett
OHIO STATE UNIVERSITY EXTENSION

2016 NAMA PHOTOGRAPHY AWARDS IN THE PICTORIAL DIVISION

1st Place: *Boletus reticuloceps* by Daniel Winkler

2nd Place: *Ceratiomyxa sphaerosperma* by Daniel Winkler

3rd Place: *Microglossum rufum* by Dianna Smith

HONORABLE MENTION

Mycena haematopus by Martin Livezy

Mycena (Atheniella) aurantiidisca by Martin Livezy

Cortinarius cinnamomeus by Alissa Allen

Hericium abietis by Daniel Winkler

Schizophyllum commune by Mark Bower

Akanthomyces sp. by Daniel Winkler

Gliophorus cf *minutulus* by Daniel Winkler

Tubifera ferruginosa by Mark Bower

Fungi on the frontier of drug discovery in neuropsychiatric diseases

By Jason Chen

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Abstract:

Much of modern medicine has been built from the chemical library of nature, yet mushrooms are conspicuously under-studied. At the same time, drug discovery efforts have become increasingly futile and effective treatments are still not yet available for many central nervous system (CNS) diseases, such as Alzheimer's disease and drug-resistant depression. Some mushrooms contain psychoactive compounds that have been used as entheogens since ancient times, and these substances hold interesting clues for new potential treatments for a variety of psychiatric and neurodegenerative diseases. In this review, I describe the pharmacology and ecology of these curious mushrooms, and review data from recent trials exploring their clinical uses. The diversity of mushrooms may provide a new path forward in CNS drug discovery.

Introduction:

I became interested in mushrooms while in medical school because of their striking diversity and unique ecology, but also because of their unexpected uses in medicine. Through my studies in neuroscience, I came to understand that the histories of neuro-pharmacology and fungal biology are woven in mycorrhizal association, ranging from the discovery of muscarine in *Amanita muscaria* to Albert Hofmann's work on ergot alkaloids, yielding (among many other pharmaceuticals) lysergic acid diethylamide (LSD). Those early breakthroughs heralded our understanding of neurotransmission and psychopharmacology.

Meanwhile, despite significant scientific advances, including the sequencing of the human genome, breakthroughs in combinatorial chemistry, and advances in gene therapy and biologic drugs, drug discovery for central nervous system (CNS) diseases is at a relative standstill. In founding a biotechnology company focused on drug discovery for neurodegenerative diseases, I learned that the cost of drug discovery has increased exponentially, doubling every decade since 1950 (Scannell et al., 2012). Massive trials in Alzheimer's disease have failed one after another (Cummings et al., 2014), and there are no approved disease-modifying therapies for most neurodegenerative diseases. New approaches are needed in CNS drug discovery, and one promising avenue for new leads may be to once again look into mushroom biology.

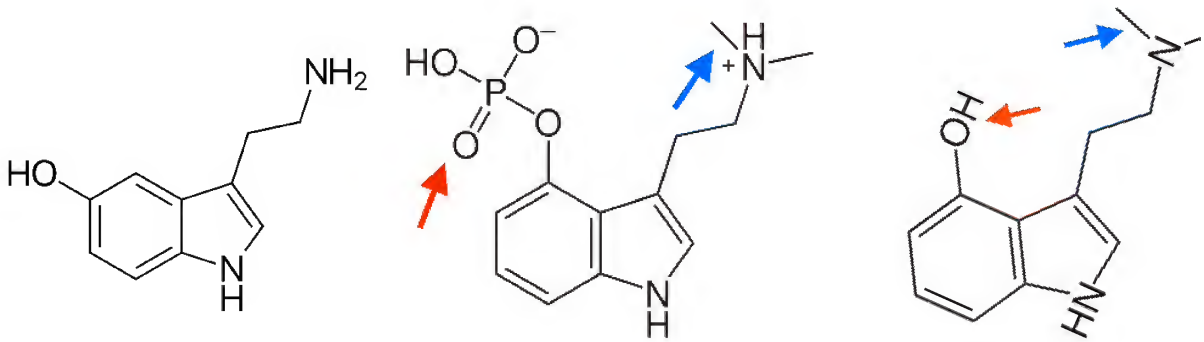
Though chemists now have the capability to synthesize ever larger and more intricate chemical libraries, the natural repertoire of mushrooms have distinct advantages. First, these compounds often hit multiple targets. Many pharmaceutical companies have tried to design drugs to target a single gene or receptor, reasoning that such specificity may result in more potency with fewer side effects. In CNS drug discovery, this approach has mostly failed, and the successful drugs of the past seem to have multiple biological targets. Second, they may contain bioactive molecules with exceedingly complex structures beyond the reach of traditional chemistry approaches. Third, mushrooms often have a long history of use and study with known safety and toxicity profiles. Here, I describe the mechanisms of action of known psychoactive mushroom compounds, review preliminary evidence from modern clinical trials, and outline a path forward for realization of this potential class of pharmaceuticals. As an important aside, many of these compounds (and the mushrooms that contain them) may be highly dangerous, and with unproven safety and efficacy.

Psilocybin – a case study in neuropsychiatric pharmacology

The so-called "hallucinogenic" psilocybin- and psilocin-containing mushrooms in the genus *Psilocybe* (and others) are among the most widely known (and used) medicinal mushrooms (Figure 1). The selective pressures that led these mushrooms to synthesize psilocybin and psilocin are unclear, but they may be useful in deterring predation (Kosentka et al., 2013). The possible use of these mushrooms is documented in several ancient cultures (Ott, 1993; Samorini, 2001). The famed ethnomycologist R. Gordon Wasson contributed to the Western understanding of the effects of psilocybin in a 1957 photo-essay, "Seeking the Magic Mushroom", in which he described his experience with mushroom ceremonies in the Sierra Mazateca region of southern Mexico. Psilocybin mushrooms and other hallucinogens were subsequently widely used in the 1960s counterculture, and even widely studied as treatment for psychiatric disease (Wesson, 2011). In the past decade, clinical trials have begun to resume (Table 1, next page).

Figure 1. *Psilocybe cubensis*. Courtesy of Benjamin Dion, observation # 135677 obtained from Mushroom Observer and are shared under the CC.

Psilocybin is metabolized in the body to psilocin, an analogue to the neurotransmitter serotonin that differs only in the position of the hydroxyl (-OH) group and in the addition of two methyl (-CH3) groups attached to the terminal nitrogen arm (Figure 2). Serotonin, also known as 5-hydoxytryptamine (5-HT), is a neurotransmitter with diverse functions in regulating mood, appetite, visual processing, movement, behavior, and rational thought. Many of these roles have been elucidated with drugs that modulate serotonergic neurotransmission, including psilocin. Psilocin tightly binds and activates the serotonin receptor 5-HT2A, and more weakly binds other serotonin receptors such as 5-HT2C and 5-HT1A, and 5-HT1D (Passie et al., 2002).



A) serotonin B) psilocybin C) psilocin

Figure 2. Chemical structure of A) serotonin; B) psilocybin, which differs from serotonin at the position of the phosphate group (red arrow) and the addition of two methyl groups on the terminal nitrogen arm (blue arrow); and C) psilocin, which differs from serotonin at the position of the hydroxyl group (red arrow) and the addition of two methyl groups on the terminal nitrogen arm (blue arrow). Images were modified from Wikipedia (www.en.wikipedia.org) courtesy of Colin M. L. Burnett, Harbin, and Liaocyed, respectively.

Authors	Year	N	Patient Population	Study Design	Dose	Results	Adverse reactions	Funding Source
Hasler et al.	2004	8	healthy subjects	within-subject, double-blind, placebo-controlled trial	45 µg/kg, 115 µg/kg, 215 µg/kg, 315 µg/kg	dose-dependent altered state of consciousness, decreased attention, improved mood	one subject with transient anxiety	Heffter Research Institute; Swiss Federal Office for Public Health
Griffiths et al.	2006	36	healthy subjects	within-subject, double-blind, placebo-controlled trial	430 µg/kg	more than half of subjects reported a spiritual experience ranking among the top five in their lifetime, with increases in positive mood	8 subjects with anxiety/dysphoria	National Institute on Drug Abuse; Council on Spiritual Practices
Moreno et al.	2006	9	obsessive compulsive disorder	modified double-blind trial	25 µg/kg, 100 µg/kg, 200 µg/kg, 300 µg/kg	acute reductions in core OCD symptoms in all subjects	one subject with transient hypertension	Multidisciplinary Association for Psychedelic Studies; Heffter Research Institute; Nathan Cummings Foundation
Sewell et al.	2006	53	cluster headache; psilocybin users	retrospective case series (survey)	variable	reports of efficacy to relieve headaches (17/19 users) and prevent headaches (15/29 for prophylaxis, 19/20 for remission extension). 22/53 reported efficacy at subhallucinogenic dose	none reported	Multidisciplinary Association for Psychedelic Studies; National Institute on Drug Abuse
Grob et al.	2011	12	advanced-stage cancer	within-subject, double-blind, placebo-controlled trial	200 µg/kg	statistically significant, but modest reduction in anxiety	none reported	Heffter Research Institute; Betsy Gordon Foundation; Nathan Cummings Foundation; National Institutes of Health
Johnson et al.	2012	18	normal subjects	within-subject, double-blind, placebo-controlled trial	70 µg/kg, 140 µg/kg, 285 µg/kg, 430 µg/kg	mild headache in a dose-dependent manner, up to ~90% at 430 µg/kg mild headaches	none reported	Beckley Foundation; Heffter Research Institute
Johnson et al.	2014	15	nicotine-dependent smokers	open-label pilot study	85 µg/kg, 430 µg/kg; 3 doses over 15 weeks with CBT	12 of 15 abstinent for 6 months	none reported	Beckley Foundation; Heffter Research Institute
Bogenschutz et al.	2015	10	alcohol-dependent drinkers	within-subject, open label trial	300 µg/kg, 400 µg/kg; 2 doses over 12 weeks with psychosocial intervention	significant decrease in percent heavy drinking days (26%) and percent drinking days (27%) after 5-12 weeks	five subjects with mild headache; one subject with nausea/vomiting	Heffter Research Institute; National Institutes of Health
Carhart-Harris et al.	2016	12	treatment-resistant depression	open-label pilot study	two doses, 10 mg and 25 mg separated by 7 days	remission in 8 of 12 patients after 1 week and 5 of 12 after 3 months	mild and transient headache, confusion, and anxiety	Medical Research Council; Beckley Foundation
Griffiths et al.	2016	51	cancer patients with depression and anxiety	within-subject, double-blind, placebo-controlled trial	two doses, 5 µg/kg and 430 µg/kg 5 weeks apart	high dose psilocybin produced improved mood and quality of life; 80% with decreased depression and anxiety at 6 months	transient increases in blood pressure; nausea/ vomiting; transient psychological stress	Heffter Research Institute; Riverstyx Foundation; Betsy Gordon Foundation; the McCormick Family; the Fetzer Institute; individuals

TABLE 1: Results of Various Studies on the Use of Psilocybin for Relief of Anxiety and Other Mental Health-Related Issues

Other drugs which increase serotonin receptor activation include the antidepressant class, selective serotonin reuptake inhibitors (SSRIs), which prevent the turnover of serotonin at synapses and hence increase activation; serotonin–norepinephrine reuptake inhibitors (SNRIs), an older, and less specific, class of antidepressants; monoamine oxidase inhibitors (MAOIs), antidepressants which block the enzyme that degrades serotonin and other neurotransmitters; serotonin releasing agents, such as fenfluramine (the "fen" of the anti-obesity medicine "fen-phen"); buspirone, an anti-anxiety drug with various effects at serotonin receptors; and triptans, which activate 5-HT1B and 5-HT1D receptors and treat migraines and other headaches. There is considerable debate about the mechanism of action of these drugs and even which receptors and off-target effects may contribute to their efficacy, but it is clear that the wide range of serotonin receptors have dramatically variable effects

Though psilocybin and psilocin are the most well-known and studied compounds in hallucinogenic mushrooms, several others exist. Among psilocybin-containing mushroom species, some also contain the structurally similar compounds, baeocystin and norbaeocystin (Leung and Paul, 1968). Another serotonin analogue, aeruginascin, has been described in *Inocybe aeruginascens* (Jensen et al., 2006). *Gymnopilus* species in Japan are known to cause hallucinations and may contain psilocybin, but there have been reports of possibly hallucinogenic gymnopilins that may inhibit nicotinic acetylcholine receptors (Kayano et al., 2014). This diversity within the psilocybin mushrooms illustrates the depth of the mushrooms' chemical library.

A florid history of perceived abuse of psychoactive mushrooms as recreational drugs in the 1960s counterculture (including in unsafe adulterated forms and in uncontrolled, chaotic environments) and experiments by cavalier psychiatrists and scientists inspired a regulatory backlash has stalled progress on research into possible medical use (Morris, 2008). Despite relatively established safety profiles, psilocybin and psilocin have been long shunned from modern medicine and are listed under Schedule I of the Controlled Substances Act, indicating 1) high potential for abuse; 2) no accepted medical use; and 3) a lack of accepted safety for use (Nutt et al., 2013). Prior to this "prohibition", psilocybin was frequently studied (though with variable rigor), and recently, these historical attitudes against the medical use of psilocybin have begun to crumble. Bold philanthropic organizations such as the Heffter Research Institute and the Multidisciplinary Association for Psychedelic Studies (MAPS) have begun to fund clinical trials to investigate the use of psilocybin (Table 1). In small, preliminary studies, psilocybin has shown efficacy in treating psychiatric diseases including depression (Carhart-Harris et al., 2016), anxiety (Griffiths et al., 2016; Grob et al., 2011; Ross et al., 2016), obsessive-compulsive disorder (Moreno et al., 2006), alcohol (Bogenschutz et al., 2015) and tobacco (Johnson et al., 2014) addiction, cluster headaches (Sewell et al., 2006), with limited side effects. The chief side effects appear to be difficult psychedelic experiences (Hasler et al., 2004) and minor headaches (Johnson et al., 2012). Notably, this year two studies of psilocybin's use for cancer-related anxiety and depression were published which catapulted the possible medical use of psilocybin to the front page of major international news organizations; news articles describing the studies were published in Scientific American, The Guardian, TIME, Newsweek, The Atlantic, New York Times, Los Angeles Times, Washington Post, and many other media outlets.

Despite promising initial results, most of these studies have small sample sizes and are poorly controlled. In the study of psilocybin as a treatment for psychiatric disease, the small sample sizes translate into low power and difficulty in distinguishing any effects from noise or placebo effect. Additionally, because of limitations on the study design, long-term dosing and follow-up has not been attempted. The long-term efficacy and tolerability of psilocybin treatment is still an open question. Additionally, long-term (but sub-psychedelic) dosing may be a viable treatment strategy, though with high potential for abuse and difficulties in trial design.

While the use of psilocybin is still highly experimental, unproven, and harshly regulated, the undeniable psychedelic effects and promising scientific and anecdotal evidence in treatment of a number of psychiatric diseases illustrates the potential of these compounds. Other mushroom-derived compounds, evolved to interact with receptors commonly found in animals, may have less dramatic effects than psilocybin but still find use in improving brain health.

Ibotenic acid and muscimol

Fig. 3 *Amanita muscaria*. Courtesy of Dmitriy Bochkov, observation # 53256.

Aside from the psilocybin mushrooms, Wasson also described the psychoactive effects of ingesting *Amanita muscaria*, the striking fly agaric (Figure 3), and postulated that it may be the basis of the mythical Vedic drug Soma (Wasson, 1968), though with only circumstantial evidence. *Amanita muscaria* is a common mushroom that is said to have mild hallucinogenic properties, although I have heard anecdotal reports that the "trip" can often be frightening and dark. *Amanita muscaria* contain the toxins ibotenic acid and muscimol, as well as small amounts of muscarine. Ibotenic acid is a potent activator of several types of glutamate receptors (the primary excitatory neurotransmitter system in the brain), and is sometimes used to selectively induce lesions by excitotoxicity in animal brains for scientific research (Jarrard, 1989). In the body, some of the ibotenic acid is decarboxylated to muscimol, an agonist of the $GABA_A$ receptor and a partial agonist of the $GABA_A$-ρ receptor (Johnston, 2014). Both ibotenic acid and muscimol can penetrate the blood-brain barrier to a greater extent than the analogous endogenous compounds. GABA is the principal inhibitory neurotransmitter in the brain, and many well-known compounds modulate $GABA_A$ activity. Allosteric regulators (binding outside of the GABA-binding site) that increase $GABA_A$ activity include barbiturates, benzodiazepines, some anesthetics, and alcohol. While muscimol binds to the GABA-binding site, it has similar effects as other $GABA_A$ activators which function as depressants, sedatives, and hypnotics. Users have described confusion, dizziness, sensory hypersensitivity, hallucinations, vivid dreams, and sleep (Michelot and Melendez-Howell, 2003). *Amanita pantherina* also contains ibotenic acid and muscimol, as well as two ibotenic acid derivatives, stizolobic acid and stizolobinic acid, which may activate kainate receptors (a type of glutamate receptor) (Chilton et al., 1974).

Muscimol probably has too many side effects to be ideal for drug development, but its use as a $GABA_A$ agonist had been explored in the 1970s for several CNS diseases, including Huntington's disease (Shoulson et al., 1978), tardive dyskinesia from Parkinson's disease treatment (Tamminga et al., 1979), and schizophrenia (Tamminga et al., 1978), with variable results. In animal models of epilepsy, muscimol injection in specific brain regions may have had some effect (Depaulis et al., 1989), but overall, these studies did not convincingly suggest any clinical utility. While muscimol may never be used medicinally, it illustrates the interesting pharmacology available in mushroom-derived compounds at multiple neurotransmitter receptors.

Ergot alkaloids

Fig. 4 *Claviceps purpurea*. Courtesy of Johannes Harnisch, observation # 26608.

Another well-known psychoactive compound, ergotamine, is present in the sclerotia of mushroom-like ascomycetes such as *Claviceps purpurea* (Figure 4). Ergot alkaloids may also be found in related species such as *Tolypocladium capitatum* and *Tolypocladium ophioglossoides* (Guzmán et al., 1998). The drug lysergic acid diethylamide (LSD) was derived from ergot alkaloids, illustrating its powerful psychotropic effects; it has also been suggested as the cause of the "witchcraft" at the center of the Salem Witch Trials (Caporael, 1976). Ergotamine itself is used (infrequently) as a migraine headache medication in the United States. Ergotamine works by constricting the blood vessels that supply the brain by acting as a 5-HT1B/5-HT1D agonist, which can reduce the pain associated with nerves

at these vessels; it also may act to reduce central neurotransmission of pain (Tfelt-Hansen et al., 2000). Ergotamine also binds to dopamine D2 and norepinephrine receptors, as well as others that have not been clearly delineated. Similarly, LSD broadly affects serotonin receptors, including acting as a 5-HT2A agonist, like psilocin. It also has affinity an acts as a partial agonist of 5-HT1 subtypes, and may also affect dopamine receptors (Passie et al., 2008). Other ergotamine derivatives have been used as medicine through history; more modern examples include cabergoline, pergolide, and lisuride, which primarily act as dopamine receptor agonists and are used to treat diseases such as Parkinson's disease and prolactinomas.

The selective forces that drove the production of these curious chemical compounds may be related to the ecology of these ascomycetes as parasites. Consider the well-known (and expensive) *Ophiocordyceps sinensis*, highly prized in traditional Chinese medicine. The fungus parasitizes the caterpillar of the ghost moth *Thitarodes armoricanus*, which lives six inches underground in the Tibetan Plateau; after the fungal infection, the caterpillar crawls toward the surface, vertical with its head up, allowing the fungus to emerge from the ground (Shang et al., 2015). Another related group of fungi, *Ophiocordyceps unilateralis* s.l. (Figure 5), parasitizes the *Camponotus leonardi* ant (de Bekker et al., 2015). The fungus somehow coerces the infected ant to enact a specific ritual: the ant begins to convulse, falling to the ground and changing its normal foraging behavior. It then climbs on the stem of low-lying plants, and at a specific time of day, bites into the underside of a leaf. The ant's muscles atrophy, freezing it in place as the fungus kills the ant and continues to grow on the leaf. The mechanisms that these fungi use to control their hosts are not well understood, but may involve secretion of ergot alkaloids and other neuroactive substances. As *Claviceps purpurea* is closely related to these *Ophiocordyceps* species, and indeed may have descended from an insect parasite ancestor (Spatafora et al., 2007), the production of psychoactive compounds like the ergot alkaloids may be related to controlling the behavior of insect hosts. In the plant pathogens, they may also provide protection against herbivores (Young et al., 2015). The unique life cycles of these fungi likely plays a large role in their production of powerful psychoactive compounds, and deeper understanding of the ecology of other species may point the way toward new potential drugs.

Fig. 5 *Ophiocordyceps unilateralis* group. Courtesy of Michael Koltzenburg, observation # 231691.

Other mushroom-derived compounds

An emerging literature on less well-known mushroom-derived compounds further illustrates the vast chemical space spanned by mushrooms. *Hericium erinaceus* (Figure 6), a traditional Chinese medicinal mushroom, contains hericenones and erinacines that have been shown to cross the blood-brain barrier and stimulate the production of nerve growth factor (NGF) in vitro, suggesting possible use in treating neurodegenerative disease (Ma et al., 2010). One of these compounds, Erinacine E, may also be a κ-opioid receptor agonist (Saito et al., 1998). Preliminary clinical trials in patients with mild cognitive impairment have shown some promise (Mori et al., 2009). *Cortinarius infractus* has been reported to cause hallucinations; two alkaloids, infractopicrin and 10-hydroxy-infractopicrin have bee isolated and identified as acetylcholinesterase inhibitors, which may be useful for the symptomatic treatment of Alzheimer's disease (Duffy, 2008; Geissler et al., 2010). Scutigeral and albaconol, derived from *Albatrellus ovinus* and *Albatrellus confluens*, respectively, have been reported to act as an antagonist of the dopamine D1 receptor and TRPV1 vanilloid receptor (that binds capsaicin in spicy foods),

Fig. 6) *Hericium erinaceus*. Courtesy of Bob Zuberbuhler, observation # 53256.

but the activity, if if any, is weak (Sterner and Szallasi, 1999; Yang et al., 2003). Though numerous claims such as these exist, they have been poorly studied and require further characterization and replication.

Furthermore, despite a large body of literature surrounding substances such as psilocybin, ibotenic acid, ergotamine, and others, there are still countless fascinating and mysterious compounds and mushrooms unknown to the modern medical literature. For example, Arora and others have described "Lilliputian hallucinations" associated with psychoactive boletes in Papua New Guinea and China (Arora, 2008; Thomas, 2003), in which afflicted people imagine diminutive people, demons, animals, or insects. Though the testimonials of these "poisoning" incidents seem far less spiritually powerful than those associated with psilocybin, the hallucinogenic compounds may provide less incentive for abuse while potentially providing a treatment option for treatment-resistant psychiatric diseases. Arora noted that despite knowledge of the hallucinatory effects, the people of Yunnan did not seem to seek them recreationally (Arora, 2008). Other potential medicinal compounds may exist in mushrooms that are otherwise poisonous (Quang et al., 2006). The co-occurrence of highly toxic substances alongside medicinally useful compounds would limit the historical experimentation with these mushrooms. With the vast majority of mushroom species classified as inedible, and an estimated 90% of mushroom species still undescribed (Hawksworth, 2001), the chemical space spanned by mushrooms appears vast.

A pathway to development of novel neuropsychiatric drugs:

It is humbling to think that mushrooms may be filled with the potential treatments of psychiatric and neurodegenerative diseases. Mushrooms are sometimes widely used in the traditional medicines of many cultures, including Asians and Eastern Europeans. Now, they have begun to be studied in the context of modern medicine. Psilocybin, derived from hallucinogenic mushrooms, has shown initial promise in early stage clinical trials for treatment of numerous psychiatric diseases, and other mushroom-derived drugs may follow. Other mushrooms also contain substances that can modulate brain function through a number of neurotransmitter receptors, with perhaps less potential for abuse than psilocybin. Other mushrooms might operate by yet-unknown mechanisms – muscarine, an agonist of the muscarinic acetylcholine receptor, was identified in 1869 from *Amanita muscaria*, but the endogenous ligand, acetylcholine, was first described in 1915 – and further study of mushrooms may illuminate new physiological processes.

Several barriers stand in the way of progress in these fronts. Particularly for the psychedelic mushrooms, harsh regulatory obstacles have precluded widespread study. Regulatory classification of controlled substances is highly politicized; for some classifications, there is little medical evidence to suggest danger to the public. While many drugs have potential for abuse and adverse reactions in recreational use, controlled medical use may be warranted, pending the results of large-scale clinical trials. Indeed, these problems are not unique to the Schedule I substances; many commonly used medicines today (e.g., opioids and barbiturates) have been abused with devastating consequences, yet still play an important role in the treatment of disease. Other drugs, such as lithium, have a narrow "therapeutic window" and must be dosed carefully. Unfortunately, classification in Schedule I is somewhat a self-fulfilling prophecy; strict regulations impede the study of the drug, thereby preventing the establishment of its legitimate medical use. Drug regulations must be revised to better protect the public yet allow legitimate research for medical applications.

Improvements are also needed in the science of screening for efficacy in CNS diseases. Artemisinin, one of the success stories of ethnobotany, was discovered by screening natural compounds for activity against malaria, an experiment for which Tu Youyou was awarded the 2015 Nobel Prize in Physiology or Medicine. However, it is much more difficult to screen for changes in behavior or for improvements in neurodegeneration or psychiatric disease. Of those models that do exist, little evidence supports their translatability to human diseases. Meanwhile, human trials have typically studied the whole mushroom, rather than a specific compound, at doses known to be safe. Advances in screening may be able to modernize these trials by narrowing down specific active molecules, enabling purification and detailed understanding of their pharmacology. Our evolving

understanding of genomics – both human and mushroom – may provide new avenues to address these issues, and modernize drug discovery using mushroom compounds.

Perhaps most relevant to amateur mycologists, the study of mushrooms as potential pharmaceuticals is still a very niche field of research. Tens of thousands of mushroom species are still not described, and even fewer of these have been studied for their pharmacological potential. Mycologists can contribute to the understanding of the ecology and evolution of mushrooms, a major enabler of drug discovery in the field. One day, perhaps work by amateur mycologists may pave the road for new treatments for patients with CNS diseases.

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NAMA AWARDS

The Lincoff Award for Contributions to Amateur Mycology is prestigious and valuable. It includes a life membership in NAMA. Please read the qualifications and submit a nomination if you know a qualified recipient.

The Knighton Service Award includes a one year membership in NAMA and paid housing, registration and foray fees to the next NAMA Foray. Many NAMA members know of a deserving local club member. Send a description of that person's contributions to your local club to mycowalt@comcast.net or by mail to:

WALT STURGEON: Chair, NAMA Awards Committee
288 E North Avenue, East Palestine, OH 44413-2369

Gary Lincoff Award for Contributions to Amateur Mycology

NAMA's Gary Lincoff Award for Contributions to Amateur Mycology is given annually to recognize a person who has contributed extraordinarily to the advancement of amateur mycology. Its recipients have often extensively conducted workshops, led forays, written or lectured widely about mushrooms and identifying mushrooms, all on a national or international level.

Selection among nominees is made by the voting of past award winners, and the award includes a plaque and lifetime membership in NAMA. Nominations are accepted until April 1st of the award year.

A name alone is not a sufficient nomination; neither is a profile on a website. Nominations for this award should include a description of the accomplishments the nominee has made in the field of amateur mycology.

The recipient must be living at the time of the award.

Nominees who were not selected to receive the award are automatically re-nominated for 4 additional years, after which the nominee's name has to be re-submitted, and it's up to the nominator to keep track of this.

Send a single copy of a Nomination by mail or email to: mycowalt@comcast.net

WALT STURGEON: Chair, NAMA Awards Committee
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The Harry and Elsie Knighton Service Award

The Harry and Elsie Knighton Service Award was established by the NAMA Board of Trustees to recognize and encourage persons who have distinguished themselves in service to their local clubs. It is named for the Knightons, whose efforts began the North American Mycological Association in the 1960's. The annual award consists of a plaque; publicity for the winner and club in The Mycophile; a one-year membership in the organization; and registration, housing and foray fees for the next NAMA Foray.

Each year's recipient is selected by the three most recent recipients of the Award.

Every NAMA-affiliated mycological club may nominate one candidate whom it feels has performed meritorious service during the current or preceding year, which has to be described!

Unselected nominees are automatically re-nominated for two additional years.

Nominations are accepted until April 1st of the award year.

Send a single copy of a Nomination by mail or email to: mycowalt@comcast.net

WALT STURGEON: Chair, NAMA Awards Committee
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AN ARIZONA MOREL STORY

By Terri Clements

Morels. They're one of my favorite edible mushrooms and at the top of the list for many foragers I know. I love the intense smoky flavor of the black morels especially. And I find the hunt exhilarating as they are usually not easy to spot under the duff. The fact that they appear at a time when there is little else of good quality fruiting doesn't hurt either. Unfortunately they aren't commonly found in Arizona for one reason primarily--lack of precipitation at the time the ground temperatures would be right for them to fruit. This last spring the rain gods were with us so we enjoyed a bounty harvest of morels, especially in post- fire areas. Many of these morels looked the same but were found in different habitats--in the seeps vs. dry open areas for example. Others looked somewhat different from one another-- due to different shading in the cap colors or folds in the stipe. From reading several recent papers on morels (Kuo et al. 2012 and Richards et al. 2015), I knew that some of the black morel species look very much alike and are indistinguishable from one another using macroscopic, microscopic or habitat data. From the Richard's paper I knew that, of the more than 60 known species of morels worldwide, 22 have been collected in North America[1]. It made me wonder how many different species we were finding in Coconino County, Arizona. On one of our Slide Fire forays, Mike Dechter and I got to talking about this and found we were both curious. I mentioned that I had sequenced a black morel from the Slide Fire in 2015 (which turned out to be *M. sextelata*--found under ponderosa pine and Douglas fir) and proposed that we combine our samples and send them off for molecular analysis. Mike agreed so I mailed eight samples to Alvarado Lab for DNA analysis.[2]

What we found out was both exciting and surprising. Surprising because according to a student of morels, Kerry O'Donnell, who kindly helped us analyze our findings, a sequence from only one black morel from Arizona had been deposited in the GenBank DNA sequence database (more on that later). This despite the Kuo paper that included morels collected across North America over the prior ten years. So how many species did our eight samples represent? Seven![3] Of the seven species, one is a yellow morel that we identified as *Morchella americana* (used to be called *M. esculenta* in many field guides but the latter species only is present in Europe and Asia). Mike collected this in its typical riparian habitat under cottonwood trees. The other six are black morels of which two are only found on post-fire sites. Interestingly, according to the Richard's paper, there are only four known species of post- fire morels worldwide and our samples represented two of them. Both were collected at the Locust Fire at the North Rim of the Grand Canyon: *M. sextelata* was found under white fir and Engelmann spruce and *M. eximia* was found under ponderosa pine. Of the four that are typically found on non-burned sites, only *M. snyderi* was found in on a non-burn area of the San Francisco Peaks under Douglas fir. The others were found on the Slide Fire site near Sedona: another specimen of *M. snyderi* was found in a seep, *M. tridentina* and *M. brunnea* were found in open areas under ponderosa pine. Now for the truly exciting part of the story! A fourth black morel, found on a non-burn area of the North Rim of the Grand Canyon under white fir, turns out to be a novel species heretofore unknown to science. It happens to be closely related to an undescribed (and therefore unnamed) black morel, *Mel-18*, known only from the Dominican Republic. This is where Kerry O'Donnell's expertise proved invaluable as we weren't sure what we had based on the sequencing we did. His determination was based on culturing of the ascospores and additional molecular work. [4] I received the news via email a few days before Christmas. And it gets better. Kerry O'Donnell has assembled a team of fungal biologists to describe this morel and give it a name, thereby increasing the total number of morel species recognized in North America and worldwide. And now the finale. Remember the one lonely species of black morel from Arizona represented in GenBank? This is the stranger than fiction part of this story. While doing research on the effects of pollution on fungal endophytes in the Chuska Mountains of the Navajo Reservation in 2009, a respected Arizonan scientist found, sequenced and deposited a sequence into GenBank that matches the black morel I collected while hunting for morels on the North Rim in 2016. We both found what turns out to be the same novel species of black morel. The University of Arizona researcher was unable to collect a specimen of

of the fruiting body as her permit was for endophytes only. The researcher is Dr. A. Elizabeth 'Betsy' Arnold, the curator of the Gilbertson Herbarium and the person to whom I gave the morel collections I sequenced including the novel species I found at the North Rim. To me this has been and continues to be an exciting adventure, but I think there is a broader message here. Namely, as avid mushroom foragers, we can make significant contributions to science by collecting, preserving and documenting (some of) our finds.

Footnotes:

1) According to Richard et al. (2015) there are three main clades or branches in the morel tree of life worldwide: Rufobrunnea with two species, Elata (black morels) with at least 36 species, and Esculenta (yellow morels) with at least 27 species worldwide. Many morel species remain undescribed in the scientific sense, especially in Asia, and therefore lack Latin binomials. Richard et al. (2015) found that Europe and North America each contain about the same number of morel species: 21 for the former and 22 for the latter. All but four of these have been described.

2) The AMS reimbursed me for the cost of sequencing. And cultures from our collections have been deposited in the ARS Culture Collection (NRRL) in Peoria, Illinois and the specimens were accessioned into the Gilbertson Herbarium by Betsy Arnold at the University of Arizona. Lastly, the DNA sequences will be deposited in GenBank.

3) These have been photographed and documented on www.mushroomobserver.org as observations. New or registered users can search the following observation numbers: 239200, 238137, 238647, 239180, 239198, 239805, 239806, 239807.

4) Now for a teachable moment. I unwittingly complicated Kerry O'Donnell's work by cross contaminating specimens with ascospores from other species in the dehydrator. As I knew nothing about his plans to culture my collections from ascospores, it didn't occur to me that contamination could happen or that it would matter if it did. The lab we used sequenced from the dehydrated fruit bodies that I sent them but Kerry O'Donnell likes to sequence from small pieces of the morel and then from pure cultures derived from ascospores of the interesting collections. The moral here is to clean your dehydrator before using it for scientific specimens and, where possible, dry each collection separately. Of course each specimen should be bagged separately in the field in paper or wax paper bags to avoid cross contamination from ascospores.

The Paul Bunyan Mushroom Club of Central Minnesota

By Gene Kremer

What became the Paul Bunyan Mushroom club started in 1989 when Paula Peters and John Mikesh met at Deep Portage Learning Center in central Minnesota where the Minnesota Mycological Society was holding a weekend mushroom "teach in." John started attending meetings of the Minesota Mycological Society in the Minneapolis, St. Paul area area when down there on business, but Paula suggested a local group would be fun and convenient. Paula put out information in the Walker, Minnesota area newspapers and we quickly picked up biologist Rosa Stolzenberg.

Paula was from Walker, John was from Pequot lakes and Rosa was from Fargo ND, but had a summer home near Nevis, Minnesota, a wide geographical spread. Shortly Anita Linberger and Mark Chekola joined and we had our basic group.

Paula's friend Anna Gerenday, who has a great knowledge of mushroooms, often came up from the Minnesota Mycological Society in St. Paul to join us on forays and teach identification. Her generosity in mentoring the group was a tremendous asset to the group. The group had monthly forays from May through October and met monthly from January through April to study identification, often using DVDs from NAMA and other sources, and to plan for the coming foray season. Over the years through dry times and recessions our gatherings have included from 3 to 30 people and our mailing list to over 150,

Around 2006 we decided to name our group, and came up with The Paul Bunyan Mushroom Club. Paul Bunyan is, of course, the folk fictional hero in Minnesota related to logging, and there are two cities and one small town in our region with statues of him and Babe the blue ox. From 2006 through 2014 we held annual mushroom dinners in November at area restaurants, attended by 30-50 people, many of them guests, as well as members of the group. Our regular restaurant changed hands, and we would like to continue the annual dinners if we are able to identify a suitable restaurant.

During 2013-2014 Lakeland Public TV in Bemidji, Minn. produced a documentary about our club. (This documentary can viewed at http://youtu.be/0TAYzQB1hPI) It first aired in the spring of 2014 and brought much attention to the Club, resulting in new members. It became clear it was time to develop a more formal structure. In 2015 we set up by-laws and elected a board of directors.

The Club draws members from a wide area of central Minnesota, with people coming to our forays from as far away as more than 100 miles. Check us out at http://pbmushroom.org

Central Michigan News from the Michigan Mushroom Hunters Club

By Sister Marie Kopin, C.P.P.S., MMHC Secretary

There has been a steady stream of educational forays at various sites in the fall of 2016 in Isabella County, Clare County, Midland County and Alcona County. Sister Marie continues working with the Chippewa Watershed Conservancy, the Mount Pleasant County Parks, the Michigan Nature Association, Central Michigan University, the Chippewa Nature Center in Midland, and the Alcona/Iosco Conservation District. The season and number of specimens improved greatly after more rains came in October. There were 66 species found in the preserve near E. Tawas.

If you would like to see what an educational mushroom foray is like, you can go to http:// www.chippewawatershedconservancy.org/ and click on "read more" by the photo of some of the members of our foray seated on the huge rock at the top of Bundy Hill in Isabella County in October. You will see another photo with an arrow to click on. The CWC staff called in a videographer who produced a 17 minute video of our two hour hunt. Bundy Hill is the newest of our CWC preserves, just purchased, and is the largest moraine in Isabella County, so Sister Marie celebrated by calling a "Members Only" hunt. Many of us former Central Michigan University students fondly recall hiking up there as young students and even having classes outdoors at the top where the view was stupendous. We had a very productive time learning about nearly 40 species with a number of "take homes" to enjoy.

Sister Marie also taught an early November class at the Isabella County Commission on Aging building in Mount Pleasant entitled "Fall Mushroom Identification Helps." It was well attended and participants brought along a number of specimens.

NAMA Foray Coming Our Way in September

What happens at a NAMA Foray? There will be numerous workshops and classes on a variety of topics, scientific research reports, updates on the latest scientific advances, photography, arts and crafts, a tasting session of delicious mushroom food, beginner and advanced levels of identification, introduction to bio-science projects, and much more. Of course there will be a silent auction, plus sales of books and crafts, and a chance to network at a big reception. Specimen tables should abound as this conference site is in the midst of many forest lands and there will be guided tours of what has been found. NAMA has been placing specimens from their annual foray's fungi collections in the Chicago Field Museum's Herbarium since 1998. There is also opportunity to network with mycologists from all over the world, as many attend. NAMA does include both Canada and Mexico in terms of affiliated clubs.

The above two articles by Sister Marie Kopin appeared in the MMHC newsletter, *Spores Illustrated*, December 2016, Issue 3.

Charles Horton Peck:

Father of Modern American Mycology

By Joel Horman

(**First published in** the Winter 2008 LI Sporeprint, and reprinted for the benefit of our many newer members.)

Amanita abrupta Peck, *Agaricus* (*Psalliota*) *placomyces* Peck, *Boletus affinis* Peck, *Boletus auriporus* Peck , *Boletus bicolor* Peck, *Cortinarius luteus* Peck, *Hebeloma sarcophyllum* Peck, *Inocybe intricata* Peck, *Russula aeruginascens* Peck, *Tricholoma equestre v. albipes* Peck. These are but a few of the more than 2,700 new species and varieties of fungi discovered and described by Charles Horton Peck (1833 -1917) the official New York State Botanist at the State Museum in Albany from 1868 until 1913. Despite his monumental contribution to mycology, he was not academically credentialed in the field, but was trained in botany, with a particular interest in the bryophytes, and an autodidact in mycology. Initially, after publishing his first paper in 1865, "The Catalogue of Mosses Presented to the State of NY", one of his friends, Elliot C. Howe, MD, a fellow bryophyte lover, urged him to work on a fungus list for NY state, offering his own collection of 267 species for a starter. Peck acquiesced, estimating that it would take him four or five years to complete; after 45 years, the task was still uncompleted. To a much lesser extent, it remains so today.

The story goes that when Peck was first employed as a schoolteacher one of his duties was to tend the fire; while feeding wood into the stove he was constantly attracted by lichens and mosses growing on the bark. This led him to communicate with fern scholars. Similarly, when he began on fungi, he studied the works of Persoon and Fries, initially sending samples he could not identify to M.C. Cooke, the royal botanist at Kew in London, and to Moses A. Curtis, a church official in North Carolina who studied fungi with Miles Joseph Berkeley in England. Four hundred specimens were sent to Cooke between 1870 -1874, many of which were described in "Grevillea", Cooke's new journal; Peck, in his early work, ascribed many species to "Cooke and Peck". The first new species published by him was *Septoria viridetingens*, a type of leaf spot Ascomycete, indicative of his far ranging interests, although he focused upon the agarics. After 1875 he did not find it necessary to consult others for identification aid and rarely co-authored a species with someone else. He became the final authority on American fungi but his interest in botany continued, and new species of flowering plants were also included in the Annual Reports of the NYS Botanist. He spent considerable time in his later years collecting the Hawthornes for the state herbarium.

During most of his years as the State Botanist he worked "single-handed and alone" without even an assistant, by himself carrying on a vast correspondence, collecting, describing, and caring for not only his own specimens but also those contributed by his many correspondents (one of which was Roy Latham-the North Fork naturalist.). Each of his annual reports scrupulously identifies his correspondents and their contributions. Many were unknown amateurs while others such as C. McIlvaine, C.H. Kaufmann, W.A. Murrill, and R.M. Underwood were of greater renown. During July, August and September he traveled to different parts of NY State, by rail-road, stage and private wagon, and walked great distances, carrying with him a portable field microscope. Larger specimens were dried in sunlight or by fire while in the field; smaller ones were remoistened and flattened between herbarium sheets, much like botanical specimens.

His favorite site apparently was North Elba, Essex County, in the Adirondacks, where subsequent collectors included George Atkinson and C.H. Kauffman. Long Island was also often visited, and many of his specimens are labeled Port Jefferson, Orient Pt., etc. On several occasions he was accompanied by George Atkinson, who in 1900 published a popular book, "Studies of American Fungi", featuring his own photographs.

Despite never having written a definitive book and being an ardent anti-evolutionist, he was a major influence on mycology during his lifetime, and his annual report comprises several thousand pages of descriptive mycology. Included in these reports are his drawings and paintings (Figure 1), which still retain their crisp immediacy. His collections are still consulted by scholars and remain an important reference. For example, Prof. Henry Beker, whom we are aiding locally in his worldwide study of the genus *Hebeloma*, has been sequencing Peck's type specimens of this genus.

Atkinson wrote a touching tribute to Peck concluding with the words, "....mycological science owe(s) Dr. Peck a fund of gratitude for what he has accomplished in spite of the many difficulties and discouragements under which he labored." These words still hold true today.

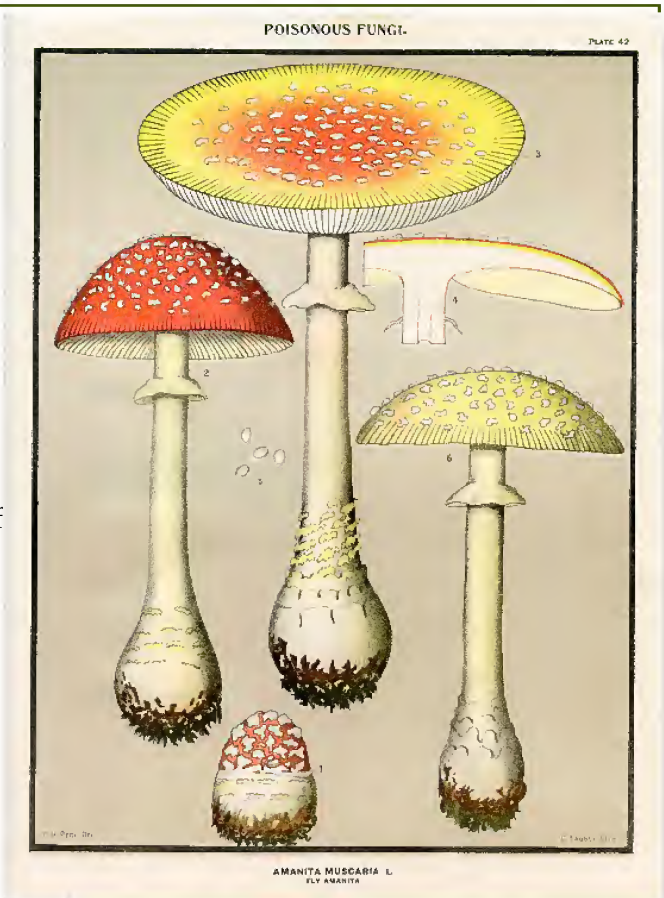

Fig. 1: ***Amanita muscaria***

NAMA's 2017 REGIONAL FORAY at PINETOP, AZ

August 10-13, 2017

The North American Mycological Association and the Arizona Mushroom Society, Inc. are pleased to announce the 2017 Arizona Regional Foray. It will be based at Camp Tatiyee in Pinetop-Lakeside, amidst the Arizona White Mountain conifer forests. Head foray mycologist will be University of Purdue's Dr. Scott Bates. He is director of the Arizona Mycota Project and the leading expert on the fungi of Arizona.

Registration will open in the beginning of April and will be limited to 75 attendees. Check out http://tinyurl.com/2017-NAMA-Regional-Foray-AZ for information updates. There is also a Facebook https://www.facebook.com/events/1920836308147937/ . If you have any questions, contact Chris May, the AMS President at 480-326-6863 or via email: ccmaymd@gmail.com.

President's Report

Our next annual foray in Cable, Wisconsin is shaping up nicely. We've been able to keep the cost down, while offering great facilities and excellent cuisine. I look forward to seeing many of you there. This year's Wildacres Regional Foray at the end of September will celebrate the 20th anniversary of this intimate, science based gathering. We add another regional foray this year in the White Mountains of Arizona. Look for details of all these events on the NAMA website.

Please note: If you go to the website, you'll see that the login button has changed. It's now one click to your username/password.

I'd like to welcome Phil Carpenter as the new Pacific Central Region Trustee. Phil joined the Fungus Federation of Santa Cruz the year it was formed. He has served as an officer of the club for most of the nearly 30 years he has been a member, including 7 years as CEO in the 90s and years as Prime Minister. He has been a key member of the annual fungus fair planning committee for the past 20 years. Maxine Stone (Plains) and Patricia Lewis (Gulf States) were re-elected as Regional Trustees for three year terms.

NAMA has an opportunity for making connections with mycologists in Mexico and establishing new ties there with mycological organizations. If you are fluent in Spanish, please contact me.

It's going to be a good year for NAMA. I'm excited about new initiatives, including a push by Dr. Rytas Vilgalys and Bill Sheehan to kick-start the North American Mycoflora Project; you'll see more on this topic in the next issue. As you know, NAMA began funding DNA sequencing of our annual foray collections a couple years ago, and Rytas, one of our Institutional Trustees, voluntarily took on that task at his lab at Duke University.

Michael Beug has been actively seeking more documentation on mushroom poisonings and is working with several poison control centers toward getting data. If you hear about a poisoning, please encourage someone involved to file an online report. His Poison Case Registry recap of 2015-2016 will be published in the summer issue. In California, we have had 15 *Amanita phalloides* poisonings during our fall/winter mushroom season; our native deadly mushroom, *Amanita ocreata*, is now out in full force.

I'm seeking members to step into three key roles:

Education Committee Chair: We've long needed a comprehensive "Basic Mushroom Information" section on the NAMA website. This committee needs to add new technology and new media, and take an active role in educating our members. If you would be willing to write some of this material yourself, or coordinate contributions, please let me know.

Medicinal Mushrooms Committee Chair: This position has been open for some time. For this emerging field of information, the work of the committee and what we post on the NAMA website needs to be accurate, and reflect current scientific understanding of potential medicinal applications. Open-minded skeptics welcome to apply!

Marketing Committee Chair: NAMA needs to improve at communicating our work, benefits and future needs to our membership. We need a good writer with knowledge of social media tools to help promote NAMA to our affiliated clubs and members.

On a personal note, my local club, the Bay Area Mycological Society, just put on our 12th Annual Fungus Fair at Point Reyes National Seashore. This event extends our partnership with the park which began back in 2005

with the Mycoblitz Forays. We reached many people who attended for the first time, and we got them interested and excited about fungi.

Finally, I encourage you to renew your dues; otherwise this is the last issue of The Mycophile you'll receive. NAMA membership is a great way to keep in touch with your mycological community, and if you are a member of an affiliated club, you receive a $5 membership discount.

David Rust
NAMA President

Wildacres Celebrates 20 Years!

By Glenda O'Neal

The Wildacres 2017 Foray is scheduled for **September 28-October 1**. Wildacres Retreat, located just off the Blue Ridge Parkway near Little Switzerland, not too far from Spruce Pine, North Carolina, is renowned for the identification of new species to the foray and to the identification of new species to the mushroom kingdom. You will have the opportunity to search for fungi along the creek sides of Armstrong Creek, Linville Falls and Crab Tree Falls, in the highlands of Mount Mitchell, and in many other areas along the beautiful Blue Ridge Parkway. Our mycologist for this year is Brandon Matheny, from the University of Tennessee. Brandon's knowledge of the fungi of the Great Smoky Mountains makes him an absolute asset to our foray. Hopefully, we will have other chief mycologists from previous Wildacres forays joining us as well. Come join us for this 25th Year Wildacres celebration. It will surely be a fantastic weekend. Please see http://www.wildacres.org/ for more information about the retreat center, or contact me, Glenda O'Neal, by email: glendakoneal@yahoo.com, or by phone (423) 863-2742 for foray information, or any questions you may have. Registration fee for this event is $250 per person, and includes three nights lodging and eight meals double occupancy. The registration form may be found on the NAMA website. This foray is limited to 40 NAMA members. Registration is expected to go quickly this year. **PLEASE PLEASE PLEASE date your check for September 28, 2017**. Checks will be deposited following the foray.

NAMA MEMBERSHIP RENEWAL

Many of you have not yet renewed your NAMA Memberships. We hope you'll take this opportunity to renew your membership online today, so we can continue to provide you all the benefits NAMA has to offer including *The Mycophile* which is full of educational articles, book reviews and news about upcoming forays such as our annual foray in the Wisconsin Northwoods, the Wildacres Foray in North Carolina and a new regional foray in the White Mountains of Arizona.

Please renew your NAMA membership today. Members of affiliated clubs receive a $5 discount. For only $25 ($30 for non-affiliated members), you will receive 6 issues of *The Mycophile* and have full access to our expanded website. Visit http://www.namyco.org/join.php to learn more.*

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Newsletter of the North American Mycological Association

THE MYCOPHILE

Mushroom of the Issue

Diatrype virescens & *Colpoma quercinum*

While some may think of ascos as boring black bumps on logs, these two small, erumpent examples both reveal their true colors under magnification. Green fruiting bodies of *Diatrype virescens* on a beech twig are speckled with the black tips of their perithecia. *Colpoma quercinum* can be a bit shy; its fruiting bodies are only visible when their oak twig is moist enough for them to burst through the substrate. Consequently, the opening and closing of the yellow apothecia can be observed and recorded with time lapse photography when specimens are soaked in water.

The 3 Foragers of the Connecticut-Valley Mycological Society (CVMS)